

## HEALTH ECONOMICS RESEARCH, INC.

822 Boylston Street, Suite 104 • Chestnut Hill, MA 02167 • (617) 738-0821

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Summary

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FINAL

THE IMPACT OF STATE HOSPITAL  
PROSPECTIVE REIMBURSEMENT PROGRAMS  
ON  
HOSPITAL CAPITAL FORMATION,  
COMPETITION  
AND  
INDUSTRIAL STRUCTURE:  
AN EVALUATION

Jerry Cromwell, Ph.D.  
Philip Burstein, Ph.D.

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### REPORTS

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Hospital Cost Inflation

The primary impetus behind public policy interest in the hospital sector is the tremendous explosion in private and public expenditures. Ever since the introduction of Medicare and Medicaid in 1966, health costs have been rising at an annual rate of more than 12 percent. Expenditures for the hospital sector alone have been climbing at approximately the same rate. Both private and public health spending have gone up, with Medicare/Medicaid costs rising from \$1-2 billion initially to nearly \$50 billion in 1981 (Freeland, 1981), and private spending quadrupling over the same period. The health care sector, which claimed 6.2 percent of GNP in 1965, took up 8.9 percent of national product in 1980. Over the same period, the proportion of the federal budget devoted to health rose from less than 2 percent to 10 percent.

Recent developments, as cited in the current Department of Health and Human Services Annual Report, have indicated that these adverse trends in health care costs are likely to continue, or even intensify, in the next decade unless something is done. In 1981, health care spending shot up 15.1 percent, with hospitals leading the way with a 17.5 percent increase. Early 1982 trends are at least as bad, with the medical care component of the Consumer Price Index being the only one with double-digit inflation for the year ending in June, 1982. Medical care alone is now contributing an entire percentage point to the annual rate of increase in consumer prices.

Other indications that the hospital sector is set to continue on its present path in spite of a declining CPI trend are (1) the tremendous backlog in Certificate of Need applications (amounting to several billions of dollars), and (2) projections of desired hospital investment reaching as high as \$145 billion for the 1980s (Lightle and Plomann, 1981; ICF, 1983). In the face of national bed occupancy rates of around 75 percent (with many states under 70%), and "excess" beds running at perhaps 10-20 percent of total beds (McClure, 1976), the current estimates of hospital investment are highly discouraging from a cost/efficiency standpoint, not to mention federal tax outlays. If hospitals are successful in borrowing the capital to achieve their renovation/expansion goals, high interest charges will place an enormous burden on the industry's already overloaded cost structure. If they are unsuccessful, the long-run asset base and could be seriously eroded. Neither possibility is desirable. (See Cohodes, 1983)

## The Problem of Excess Capital

In diagnosing the ills of the system, three structural symptoms take on particular importance:

- (1) industry bed occupancy rates that have hovered for a decade around 75 percent--implying that one out of every four beds goes unused on the typical day in the U.S.; low capacity utilization is virtually true everywhere: even an 80 percent average occupancy rate was achieved in only 7 states in 1980;
- (2) increasing intensity of resource use per admission, adding 22 percent to the annual rate of hospital cost inflation (Freeland and Schendler, 1981); and
- (3) rapidly diffusing, costly services like open heart surgery and intensive care that often are grossly underutilized and even of questionable medical value in certain instances (Cromwell and Kanak, 1982).

The lack of price competition in the face of growing demand is generally conceded to be the main reason behind these problems. Three factors render the hospital sector particularly vulnerable to the more unfortunate aspects of non-price competition. First, rapid technological advance in the health care field continually makes new, specialized innovations available. Second, there is a reluctance to withhold any technological aids when human life is involved. Third, cost-based reimbursement systems have tended to pass through capital costs automatically, weakening the cost constraint on investment. Under these circumstances, the opening of new hospitals or better insurance coverage in a given area may have adverse expenditure effects if non-price competition outweighs such vestiges of price competition as might exist.

## Solutions to Excess Capital Formation

Two broad solutions to the "excess capital problem" include: (1) more (or different) regulation; and (2) more competition. Regulatory efforts impinge on capital growth in three ways. First, there are programs like Certificate of Need and the Federal Section 1122 which apply direct financial sanctions to unauthorized bed or large equipment investment. These programs appear to have been relatively ineffective and inequitable in most states, primarily because of local vested interests in hospital growth (Havighurst, 1977; Salkever and Bice, 1976; PAI, 1981). Second, utilization review and Professional Standards Review Organizations (PSROs) have an indirect effect on hospital capital needs

by affecting hospital utilization, admission rates, and average stays. Significant reductions in unnecessary days, for example, lowers occupancy rates, hence discouraging bed growth. While some evidence exists that PSPOs have reduced utilization (BCPA/ORDS, 1980), no empirical link with capital formation per se has been documented.

Finally, many states have established Prospective Reimbursement (PR) programs that set hospital payment rates for one or more classes of patients, e.g., Medicaid, Blue Cross. Preliminary results suggest that some of these have been effective in controlling hospital costs (Coelen and Sullivan, 1981) and proliferation of expensive services (Cromwell and Kanak, 1982). This form of regulation is usually preferred over other methods because it is (a) less intrusive, (b) less subject to co-optation by the industry or consumer groups, (c) less costly to administer, as well as (d) giving administrators more latitude in adjusting inputs to stay within the rates. Very little, if any, evidence exists, however, that unequivocally links a particular rate-setting program to a slower rate of capital formation (see, for example, Sloan and Steinwald, 1980; Cromwell, et al., 1976). The rest of this monograph will be devoted to an investigation of such a linkage.

To be complete, brief mention is made here of the alternative set of competitive approaches. One broad set is designed to raise the price of care to consumers in the hope that they will take a vested interest in the extent and cost of their medical care. Included here are higher insurance co-pays, higher deductibles, more limited insurance coverage, and smaller tax write-offs on employer-paid health insurance. All of these should work like PSPOs in reducing utilization, except from the consumer rather than the physician side.

The second competitive approach includes a variety of HMO arrangements like the Kaiser plans, the Harvard Health Plan, and Independent Practice Associations (IPAs). All of these make the physician a gatekeeper to the hospital with incentives to reduce inpatient utilization. Thus, in areas with large HMO enrollments, we would expect lower hospital utilization, fewer beds per capita, and less need for new capital--at least for the area as a whole. While the results presented below focus on regulatory effects under prospective payment programs, some interesting insights are gleaned on HMOs and other forms of competition as a positive by-product.

#### Overview of Evaluation and Findings

In this section we provide a brief overview of the National Hospital Rate Setting Study, of which this monograph is a part, and some key findings per-

taining to capital formation. Other monographs have dealt with such topics as the impact PR has had on hospital costs, revenues, lengths of stay, patient outcomes, productivity, labor mix, and access to care.

• A Brief Description of the Prospective Reimbursement Programs

In response to high rates of increase in hospital expenditures, prospective reimbursement programs have been instituted by over 30 state, industry and payer groups. Most of these programs are quite distinct and most have undergone significant changes over time, reflecting differing objectives and differing political environments. Above all, the diversity of programs is a reflection of a widespread belief that better reimbursement incentives are needed, and uncertainty about what form of change is best.

Basic program features for the fifteen study programs are shown in Table 1-1 for reference. The objective of these revenue control programs has generally been to provide incentives for prudent management by putting hospitals at some risk for the consequences of expenditure decisions. To a lesser extent, the programs have tried to make reimbursements more predictable and to unify reimbursement approaches across payers, possibly eliminating unwarranted price differentials. This is done by establishing approved budgets or payment rates before each fiscal year begins, allowing the hospital to keep some or all of any surplus at year end or absorb part or all of any deficit.

As revenue limiting programs, the extent to which expenditures are influenced is determined by the way hospital managers respond to program incentives. It is also the prerogative of managers to decide how expenditure reductions (if any) are to be allocated within the institution; whether nurse staffing, scope of services, or ancillary utilization are to be targeted as the source of savings; whether revenue restrictions will be met through asset consumption (deficits) or through expenditure cuts; whether or not cuts will impair vital patient care services. Where the fixed rates are stringent, or close to average costs, hospitals will be under more pressure to alter behavior.

The great strength of prospective payment is that the hospital has wide latitude in meeting these rates, from lengthening stays to reducing inefficiency to divesting in underutilized plant and equipment. At the same time, this flexibility makes impact analysis more complicated because we have to look in so many places. For example, if hospitals are receiving payments below average cost primarily because expensive, underutilized beds are driving costs up, then hospitals may well close down some beds and save money, or they



Table 1.10 Features of Prospective Reimbursement Programs Prior to 1980

Program	Fiscal Year Review Based on Major Charges	Locus of Authority	Scope of Payer Coverage	Hospital Participation	Compliance	Provision for Negotiation	Type of Prospective Limit
Arizona (DAJ23)	1973	DOH <sup>1</sup> /BLAs	Blue Cross Commercial Self-pay	Mandatory	Voluntary (public disclosure)	Yes	Budget review only
Colorado (DCO11)	1972	DOH	Medicaid	Mandatory	Mandatory	Yes	Per diem
Connecticut (DCV13)	1973	Independent Commission	Commercial <sup>2</sup> Self-pay	Mandatory	Mandatory	Yes	Total revenue less allowances
Indiana	1960	Indiana Blue Cross	Blue Cross Commercial Self-pay	Mandatory (for Blue Cross)	Mandatory (for Blue Cross)	Yes	Budget review
Kentucky (DKV11)	1971	Blue Cross	Blue Cross	Voluntary	Mandatory	Yes	Budget review only
Maryland (DMO73) (DMO78) (DCIMK)	1973 1978 LAS 1977-1979 GTR	Independent Commission	Blue Cross Charge payers All payers All payers after 1978	Mandatory Mandatory Mandatory	Mandatory Mandatory Mandatory	Yes Yes Yes	Budget/rate review Budget/rate review Per case-rate to rate
Massachusetts (DMA75) (DMA76)	1973 1976	Independent Commission	Medicaid All payers except Medicare	Mandatory Mandatory	Mandatory Mandatory	No No for Medicaid	Per diem Per diem—Medicaid Charges—other
Minnesota (DMW75)	1973	Hospital association from DOH	Blue Cross Commercial Self-pay	Mandatory	Voluntary	Yes	Budget review only
Nebraska (DMW78)	1973, ended 1978	Hospital association	Blue Cross Commercial Self-pay	Voluntary	Voluntary	Yes	Budget review only
New Jersey (DMA73) (DMA77)	1973 1977	DOH	Blue Cross Medicaid	Mandatory Mandatory	Mandatory Mandatory	Yes Yes	Per diem Per diem (more detailed review)
New York (DMT11) (DMT6) (DMT78)	1971 1976 1978	DOH/Blue Cross	Blue Cross and Medicaid Add charge payers	Mandatory Mandatory Mandatory	Mandatory Mandatory Mandatory	No No No	Per diem Per diem (odd tighter screens) Per diem—Medicaid/SG; charges—others (add external LOS penalty)
Rhode Island (DAI75)	1975	Blue Cross/State Budget office	Blue Cross/Medicaid/Medicare	Mandatory	Mandatory	Yes	Budget/rate review and statewide cap
Washington (DMA76) (DMA78) (DMA78K) (DMA78Y)	1976 1978 1978 1978	Washington State Hospital Commission	All except Medicare/Medicaid All payers All payers All payers	Mandatory Mandatory Mandatory Mandatory	Mandatory Mandatory Mandatory Mandatory	Yes Yes Yes Yes	Budget/unit charges review Budget with volume incentive Budget with no volume incentive Budget/unit charges review
Wisconsin (DM171) (DM177)	1971 1977	Committee of state/BC/industry	Blue Cross Add all except Medicare	Mandatory Mandatory	Mandatory Mandatory	Yes Yes	Budget review and approval
Western Pennsylvania (DM771) (DM774) (DM777)	1971 1974 1979	Blue Cross	Blue Cross Add Medicare Add Medicaid	Voluntary Voluntary Voluntary	Mandatory Mandatory Mandatory	Yes	Per diem

<sup>1</sup> Department of Health<sup>2</sup> Blue Cross patients are covered under a separate Blue Cross-sponsored experiment.<sup>3</sup> Department of Human Services

may try to increase utilization in various ways. Their final choice obviously has major policy significance, while the range of alternatives prevents us from examining bed complements as the only "solution" to the problem.

#### Summary of Data Bases and Methods

The monograph concerns two\* key structural areas of hospital behavior:

- o capital formation; and
- o openings, closures, and mergers

under prospective rate setting. Analytic variables considered explicitly included, at the hospital level,

- o gross and net investment, by asset type (buildings vs. equipment);
- o changes in bedsize;
- o investment per bed;
- o occupancy rates;
- o average age of buildings;
- o probability of closing or merging.

At the county level, we also analyzed:

- o beds per capita;
- o occupancy rates;
- o probability of a hospital opening; and the
- o net creation rate (openings minus closures and mergers).

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\*A related third area dealing with service adoption has already been analyzed by one of the authors in an earlier paper (Cromwell and Kanak, 1982), reproduced in Appendix E. Results are summarized in the next section.

Three data bases were used for the hospital and county analyses:

- o ABA Annual Hospital Survey, giving statistics on beds occupancy, ownership, and teaching status;
- o ABA Change-of-Status Survey, listing openings, closures, and mergers; and
- o HCFA Medicare Cost Reports, providing balance sheet information on fixed assets from which variants of the rate of capital formation were derived.

The data spanned the entire decade of the 1970s and were collected on all short-term general hospitals in the 15 states listed in Table 1-1 plus a one-quarter random sample of remaining U.S. hospitals of similar type.

Analysis included a combination of tabular-trend and econometric methods using a quasi-experimental, four-way design. To isolate the rate-setting effect from other forces at work, industry performance under each state program was compared both to its previous history in the state as well as to a national sample never under prospective reimbursement. To attribute an effect to PR, it was not enough just to compare performance before and after program implementation; performance also had to be "different," in a statistical sense, from what we might have predicted given the changing hospital marketplace. Slower observed investment under PR, to cite one example, may have truly been due to the program or simply to a rapid increase in the cost of acquiring new capital. Our four-way design controlled as much as possible for such false positives, if we may borrow some medical jargon.

#### Summary of Findings

##### What evidence exists that state hospital rate-setting programs as a whole have constrained the rate of capital formation?

The answer, simply, is: not much. We are not able to document a major reduction in the rate of hospital capital investment or bed expansion across a wide number of different programs. This is not entirely unexpected for two reasons. First, capital formation decisions have a long gestation period which means that any change in reimbursement method is likely to take awhile before affecting this area of behavior. Many prospective reimbursement programs were implemented in the mid-1970s, leaving us with only a few years to measure their effects. It may have been too short a period to uncover long-run impacts on capital formation. Second, if rate setting is responsible

for lower, or even negative, operating margins, it is possible that hospitals might accelerate renovation and replacement decisions to improve their cash flow.

Have any particular prospective reimbursement programs slowed the rate of capital formation?

Evidence does exist that a small number of programs may have had an effect.

- o In Kentucky, Massachusetts, Minnesota, and maybe New York, a decline in the average annual rate of investment is found;
- o In New Jersey, the rate of addition of new beds appears to be definitely lower; and
- o By 1978 in New York, the rate of new investment in major movable equipment may have been reduced over what we would have predicted.

The pattern of results does not appear to be correlated with any particular program characteristic like mandatory compliance or payer coverage. Kentucky and Minnesota had voluntary compliance during our evaluation period while Massachusetts, New Jersey, and New York were mandatory.

Even though average capital formation may not have been significantly constrained by rate setting, do we see more variance among providers, more "winners" and "losers" in terms of asset growth or decline?

Again, the answer is no. While it is true that hospitals under rate-setting do not reflect the national shift towards larger investments during the 1970s (except for Maryland), neither do we see a big shift towards disinvestment. This is not to say there haven't been some "losers." There have, as we discuss below. What it does mean is that among surviving institutions asset values are not deteriorating in a growing number of hospitals.

Has any slowing of capital formation resulted in hospitals laboring under an older, less productive capital stock?

Here the answer is: definitely no. There was essentially no change in the average age of hospital buildings after several years of prospective reimbursement. New York hospitals, for example, which began the 1970s with a

capital stock 16 percent older than the control group, had no further aging of the stock. The one possible exception is Rhode Island, which had a large investment push in the 1970s with little thereafter.

Is there any evidence that prospective reimbursement has reduced the number of excess beds per capita?

Three states show declining bed-per-capita rates under rate-setting: Arizona, Massachusetts, and New York. We discount the Arizona finding because population growth has been rapid, essentially outstripping the industry's ability to keep pace. Bed expansion, as we show, responds very slowly to spurts in demand. Massachusetts and New York, on the other hand, serve stable, or declining populations, and their results can be taken more seriously as a program effect. According to our estimates, the New York program could be "saving" as many as 650 beds per year, or \$30 million in reduced capital formation. This amounts to about one percent of the industry's net total assets. Cumulated over the over the program's first nine years, this comes to nearly \$300 million.

Is there any other evidence that the hospital industry has become more efficient under prospective reimbursement?

Here the results are mixed. On the positive side, occupancy rates in New York went from 84 percent in 1971 to 87 percent by decade's end, implying a significant improvement in capacity utilization. This improvement is even more remarkable when one considers that New York's initial rate was the highest in the nation to begin with. By 1979, 3/4 of its hospitals had occupancy rates above 79 percent, 1/4 above 90 percent. Furthermore, most other eastern, mandatory programs started with high occupancy rates and actually raised them. On the negative side, many other hospitals under prospective reimbursement -- those in Colorado, Minnesota, Nebraska, Washington, and Wisconsin -- failed to make any improvements, even though occupancy rates of 70 percent were typical. The limited, voluntary nature of these programs may explain the null findings on capacity utilization.

Given the new data gathered on assets per bed, what "savings" could be realized through greater capacity utilization?

Minnesota's case is a good example. If prospective reimbursement had managed to raise its 1979 occupancy rate from 70 percent just to New York's

base period 84 percent, we estimate that 4,000 beds could be saved and \$150 million in capital formation. Because there are so many states with rates similar to Minnesota's, the potential savings under rate setting could run into the billions of dollars, all of which means less cost inflation. It also suggests that a prime target of rate setting should be empty beds -- as it was in New York. At the same time, we note that inappropriate utilization just to fill beds may result in greater expenditures, not less, if prospective rates are not sensitive to this perverse response.

What other regulatory and competitive findings do we find pertaining to capital formation?

First, greater HMO penetration is associated with slower rates of bed growth per hospital, and, possibly with slower equipment investment as well.

Second, more physicians, particularly specialists, are invariably associated with greater total investment, capital deepening, and bed growth. Because more hospital beds in an area attract specialists, the direction of causation goes both ways, but less specialist concentration and more primary care could have retarding effects on both hospital and physician expenditures.

Third, greater nursing home bed availability is associated with less hospital capital formation and bed growth, holding other factors constant. This points to the advantages of a coordinated public policy regarding the mix of short- and long-term beds in a community. Too stringent nursing home regulation, for example, may save on our type of system cost while encouraging another, even more costly, form of bed-care.

Fourth, we find a significant, retarding effect on beds per capita under state Certificate of Need programs, but not effects on investment. This conforms to previous C/N evaluations showing slower bed growth, offset by greater capital deepening. To what extent C/N and prospective reimbursement may be complementary, or reinforcing, is unknown. New York has had both programs for over a decade, so we are unable to disentangle their joint effects very well. Our judgment, based on the analysis, is that C/N can slow bed growth, and maybe an effective substitute for prospective reimbursement, but only in this one area. Prospective reimbursement, if stringently applied, would dominate C/N in the sense that it can constrain both bed and overall asset growth. The biggest drawback to a tough rate-setting program is that it may drive out of business some hospitals suffering from heavy bad debts through no fault of their own. The result could be a fairly indiscriminate closing of needed beds. New York has been faced with this problem for several

years now, and relies on health planning to coordinate reorganizational activities to reduce the inequities associated with in any impersonal, formulary, system.

What evidence is there that prospective reimbursement programs have slowed the rate of hospital service proliferation and encouraged service sharing?

First, diffusion rates in states with mandated rate setting are definitely lower than elsewhere. Complex services, for example, were diffusing at only about three-fourths the rate in PR hospitals compared to the national control group. Care should be taken in accepting these results, however, as only Minnesota and New York showed retarding effects on service proliferation generally once other influential variables were held constant. Nevertheless, the fact that we observe an across-the-board reduction in service diffusion in New York is indicative of the potential of rate setting in this area.

When services were analyzed individually, we also found retarding effects in otherwise rapidly diffusing services in many programs: New Jersey, Washington, Maryland, Wisconsin, and Massachusetts. ICUs, open heart surgery, EEGs, radioisotopes, physical therapy, and the social work department appear to be the most affected by rate setting.

No evidence was found to support the contention that rate setting encouraged more sharing of services.

Has prospective reimbursement increased the rate at which community hospitals close or merge?

Prospective reimbursement may have increased the closure rate in a maximum of four states: Massachusetts, New York, New Jersey and possibly Arizona. We place the most confidence in the results for Massachusetts and New York since they are based on statistically significant regression coefficients and a strong trend in the unadjusted closure rate. The positive trend result for New Jersey is statistically weaker after holding other factors constant, and the finding for Arizona is highly tentative in that it is based solely on a regression coefficient that is fairly large, but not statistically significant. In the eleven PR states not listed above, no impact on hospital closure was detected. No PR program was found to have a significant impact on the other component of hospital dissolution; namely mergers.

Has rate-setting significantly decreased the number of hospitals in any PR state to an extent likely to seriously affect access to hospital services?

Even in the few states where PR was associated with a decline in the number of hospitals, the number of hospitals dissolved by these programs was small. According to our estimates, PR induced only fifteen additional dissolutions over the entire study period: eight in New York, four in Massachusetts, and three in Arizona. In none of these cases was the number of hospitals dissolved due to PR greater than five percent of the average number of hospitals existing in the state during the study period. No larger increase was expected, for the dissolution rate nationally is so small (2% annually) that even a considerable percentage increase in it due to PR would not have much effect on the absolute number of hospitals during the short time available to us for observation. This is not to say, of course, that the local impacts of a particular PR-induced closure could not be important.



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